November 29, 2016

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: PS Docket No. 07-114 Wireless E911 Location Accuracy Requirements
Filed by upload

Dear Ms. Dortch,

1. <u>FindMeSAR.com – A 'no cost' public service from me to the world</u>

Over the years I have enjoyed a variety of outdoor recreation. Fortunately I have never needed to call for help but I know others who have not been as lucky. Vast numbers of people enjoy outdoor activities such as hiking, hunting, fishing, riding ATVs, etc. When we get in trouble and need to call 911, **we are not at a dispatchable street address**. Instead, the fastest way to find us is with accurate coordinates.

Every week or so it seems like there is another story in the press about someone who called 911 with a cell phone and it took first responders a much longer time to arrive than if the carrier had provided timely and accurate phase 2 coordinates to the PSAP. For example, below is a link to a November 20, 2016 story. This guy was stuck in mud up to his waist. Although he stayed on his cell phone with the PSAP, the carrier only provided coordinates for the general area. So instead of being able to go straight to this guy, it took searchers well over an hour to find him.
http://www.mlive.com/news/kalamazoo/index.ssf/2016/11/massive_search_effort_finds_ma.html

In addition to enjoying outdoor recreation, I also happen to be an analyst and software developer. This issue of **911 wireless location accuracy** has resonated with me to the extent that I am doing **pro bono** work to help fix it. Every PSAP in the country should have free access to the same technology that Uber and other location savvy apps use to find people. Since technology can find people to give them a ride, the same tech ought to be able to find the same person in order to save their life.

As a "no cost' public service I have developed **FindMeSAR** (https://findmesar.com). This is a browser app, not a native app. When this app is opened with the browser on a cell phone, it uses the phone's location services to continually display the user's **coordinates, accuracy and timestamp** until the user taps "Stop". The user can cycle through four different coordinate formats, each with a different colored screen. Usually the accuracy improves to 20 meters or

better in well under 30 seconds. FindMeSAR has been accepted for listing on the APCO app page (http://appcomm.org/) however at the time of writing it has not yet been added to that page.[1]

> When (1) the carrier fails to provide accurate and timely phase 2 coordinates and (2) the caller cannot adequately describe their location, then any PSAP can ask the caller to try browsing to findmesar.com as a **backup plan**.

When other methods for quickly getting accurate coordinates for a wireless caller fail, the 911 call taker can ask the caller to:

1. Browse to **findmesar.com**
2. Tap the "Next format" button until the yellow screen appears. This screen shows the caller's location in decimal degrees which is the same format the wireless carriers use to send location data to PSAPs.
3. Wait a few seconds for the accuracy to get to 30 meters or smaller.
4. Tap "Stop".
5. Read off the **coordinates, accuracy, timestamp** and (optionally) **elevation**.[2]

Please take a moment and try this with your own phone. You will see that FindMeSAR is easy, fast and accurate. And since it is a browser app it will run on any iOS or Android phone.

Most phones manufactured within the last 4 to 5 years will produce accurate coordinates in heavy forest, wildland canyons, urban canyons and in a room with a window. These phones use data from both the USA satellites ("GPS") and Russian satellites ("GLONASS"). Note that a caller with an Android phone should be instructed to go into their settings and change the location mode (sometimes called method) to **GPS only**. This can be critical since the power saving mode ignores satellite data and the high accuracy mode can allow data from cell towers to degrade the more accurate location data produced by the satellites.[3]

While FindMeSAR will work for most 911 calls, it will not work for the following calls.

1. The phone does not have a data plan. This includes deactivated and unactivated phones.
2. The phone has a weak internet connection and can only text.

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[1] Personal email from Mark Reddish, APCO.

[2] This elevation value comes from a USGS server and has nothing to do with building floors. Instead it is an approximation of elevation above sea level for someone standing on the ground at those coordinates.

[3] The names of the three location modes vary on different Android devices.

3. The phone is a flip phones or feature phone. They do not have a browser.

Also, if the caller's phone supports VoLTE (Voice over LTE) then the caller should be able to use FindMeSAR while remaining online with the PSAP. Otherwise the 911 call will need to terminate so the caller can use the app.[4]

FindMeSAR is **open source**. Anyone who knows how to read code can look at the source code and confirm there is **no evil intent**. This project is part of my way to "pay it forward" and my reward is knowing that I might be able to help someone who needs help.

For more information please open FindMeSAR and tap the **"About"** button.

2. Wireless location reporting requirements

This section addresses the reporting requirements that are contained in Code of Federal Regulations (CFR) 20.18(k) ("PSAP reports").[5] These are reports that a carrier must produce when requested by a PSAP.

In an emergency situation the public wants the wireless carrier handling their call to provide the PSAP with accurate phase 2 coordinates so help can arrive quickly. After all, the speed with which help arrives could be a **life-or-death matter**. Thus when anyone is comparing cell phone plans from different carriers, one critical piece of information that the public ought to have access to is how well do the different carriers perform when providing coordinates to PSAPs.

This seems like such a common sense no-brainer that I find myself surprised to be writing to the Commission on this topic. Unfortunately in recent filings many carriers are lobbying the Commission to take steps to prevent the public from having access to the PSAP reports and to keep the data therein a tightly held secret.

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[4] The 911 call taker needs to remember to release the 5 minute lock so the caller can browse to findmesar.com.

[5] CFR 20.18(k) (emphasis added):
Provision of live 911 call data for PSAPs. Notwithstanding other 911 call data collection and reporting requirements in paragraph (I) of this section, CMRS providers must record information on all live 911 calls, including, but not limited to, the positioning source method used to provide a location fix associated with the call. CMRS providers must also record the confidence and uncertainty data that they provide pursuant to paragraphs (j)(1) through (3) of this section. **This information must be made available to PSAPs upon request, and shall be retained for a period of two years.**

Please see the letter in this docket dated October 25, 2016 from the Competitive Carriers Association (CCA). This letter argues that the PSAP reports should be secret and "used for compliance and evaluation purposes only, and prevent information discovery outside the normal course of this proceeding." Yet in the same letter at the bottom of page 2 the CCA asserts its desire to "promote open channels of communication and consumer safety during and after emergencies." Notably this letter fails to shed light on how preventing the public from seeing the PSAP reports achieves the CCA's stated goal of open communication.

These PSAP reports are the one and only way the public has of making a well-informed decision as to which carrier in their area will most likely provide timely and accurate coordinates to the local PSAP when they call 911. There is no possible way that **the public** benefits by keeping this data secret. And if it turns out that carriers who perform poorly with respect to phase 2 coordinates lose business based on the PSAP reports being public, then that should be a **powerful economic motivation** for those carrier to improve their ability to provide PSAPs with accurate and timely phase 2 coordinates.

Given the reality that (1) there are 6,000+ PSAPs and (2) most data analysis happens with Excel, the Commission should require that all PSAP reports be similar such that **the same Excel macro can analyze any PSAP report.** If the PSAP reports have multiple layouts, multiple formats, multiple file types, multiple sequences of data fields, etc, then it will be - as a practical matter - impossible for the Commission or anyone else to detect trends in the data.

Also in this docket is a September 21, 2016 letter from AT&T Mobility, Sprint, T-Mobile, Verizon and others ("AT&T letter"). This letter refers to the requirement for quarterly/biannual reporting of aggregate live 911 call location data and states that this data should be treated as confidential. **The letter makes no attempt whatsoever to explain why the public should be barred from seeing this potentially life saving information.** If carrier 'A' in an area uses network location technology and often does a poor job of providing phase 2 coordinates and carrier 'B' uses handset location technology and general does a good job of providing phase 2 coordinates, the public is entitled to know that critical information by having **direct access to the aggregate reports** prior to those reports being washed by a corporate spin machine.

The slides that are part of the AT&T letter also address the PSAP reports. While not plainly arguing that the PSAP reports should be secret, the letter does argue the PSAP reports should be for "troubleshooting purposes". The Commission should state that the PSAP reports are not limited to this narrow purpose but instead are public documents that can be used for any lawful purpose.

The AT&T letter also seeks to limit the scope of data contained in the PSAP reports by arguing that a PSAP report should (1) only cover a "previous quarter" even though the carrier has to maintain two years of data, (2) **not** include the critically important confidence value [i.e. **coordinate accuracy**] with the individual call data but instead only include location confidence data as a "Collective Statistic", (3) only include location data for the first 30 seconds of a 911

call, (4) exclude location data from NSI devices, MVNOs, Interconnected VoIP (e.g., VoWiFi), Over-the-Top VoIP and test calls.

The Commission should make it plain that a primary purpose of the PSAP reports is to illuminate and not obfuscate. This docket is about the accuracy of coordinates for wireless calls. Unless the PSAP reports include the coordinate **confidence value [i.e. coordinate accuracy] for individual calls**, neither the Commission nor the public will be able to make a well-informed independent determination as to the accuracy of the coordinates that a carrier provides to the PSAP.

Now let's **drill down** on this issue of coordinate accuracy. No doubt carriers often produce several coordinates for the same 911 call and these coordinates have different accuracy (i.e. confidence) values. Typically the coordinate accuracy would improve as a 911 call continues and then at some point the accuracy is more-or-less as good as it is going to get. Limiting the PSAP report to the coordinate and confidence values 30 seconds into the call will hide useful data. For example, are the coordinates available 60 seconds into a call usually much more accurate than the 30 second coordinates? Is there a significant difference between network coordinates and handset coordinates with respect to coordinate accuracy 30 seconds and 60 seconds into a call?

Also relevant is the fact that phase 2 coordinate data is a two-step process.

Step 1: Coordinate data goes into a database
Step 2: The PSAP requests coordinate data from the database

Will the PSAP reports contain just the step 1 data or just the step 2 data, or both? The most useful answer is "both" since this will immediately alert any PSAP that has a pattern of not making enough requests (i.e. bids) to the database for the most recent phase 2 coordinate and confidence values.

Also on the topic of shedding light, if the Commission is going to allow any calls to be excluded from the PSAP reports, as argued by the AT&T letter, then the Commission should provide a **narrowly defined list of criteria** under which a call could be excluded. However the PSAP report should still be required to include a list of those narrow criteria and the number of calls excluded under each criteria for that reporting period.

The AT&T letter also claims that carriers need up to 60 days to produce a PSAP report when requested. No explanation for this long delay is provided. Surely the carriers will have this data in digital form such that a few button presses will produce the report. **It does not take 60 days for someone to sit down at a keyboard and press those buttons.**

Nor does it appear that the requirement for PSAP reports will be a burden on the carriers. About 3 weeks ago I wrote to most of the PSAPs in Washington State, cited the state's public disclosure statute and requested a copy of any PSAP reports that have been obtained. Almost all of the

PSAPs I contacted have replied and every reply stated that they have not requested any such reports. I am still waiting to hear from just a few PSAPs. **I would certainly like to see a PSAP report but so far I have been unable to locate one from any PSAP anywhere.**

In summary for this section, the PSAP reports should be:

- Public and able to be used for any lawful purpose
- Submitted in a uniform manner such that the same excel macro can analyze any PSAP report
- Be produced within 7 calendar days of request
- Not be limited in scope as requested by the AT&T letter

3. GLONASS

In order to efficiently discuss GLONASS we need to all use the same terminology.

GPS	USA satellites
A-GPS	Assistance data for USA satellites
GLONASS	Russian satellites
A-GLONASS	Assistance data for Russian satellites
A-GNSS	Assistance data for both USA and Russian satellites

This docket includes a November 18, 2014 letter from the major carriers laying out their idea of a roadmap and referring to GLONASS as part of the solution for accurate coordinates for wireless calls to 911. The notion that Russian satellites would be used for this purpose caused quite a stir and opposition appeared.

Please be advised that the GLONASS horse has not only left the barn but it is 20 miles down the road, running hard and showing no sign of slowing down. Phones that use both the USA and Russian constellations can see more satellites. More satellites = more data = better accuracy. Europe (Galileo), China (BeiDou) and India (NAVIC) are working on their own satellite constellations.

On October 2011 Apple introduced the iPhone 4s. That was the first iPhone that uses both GPS and GLONASS as part of the phone's location services. All iPhones since also use both of these satellite constellations as part of the phone's location services. **iPhone users have no way to turn GLONASS off.**

Likewise, most Android phones made within the last few years also use both GPS and GLONASS as part of their location services. Simply do a google search for the specs for any Android phone and you will see if GLONASS is listed in the specs. Or do a Google search for: list android phones supporting glonass. **Android users have no way to turn GLONASS off.**

However, there is an important aspect of GLONASS that is not well understood and rarely mentioned.

> It is not clear which models of cell phones support **A-GLONASS**. There is little-to-no information available on this point.

Why is this important? In order for a phone (or any other GPS savvy device) to determine its location using data from a satellite constellation, the phone must have current almanac and related data for that constellation. There are two ways for a phone to get this data.

Option 1: The phone gets this **'assisted'** data very quickly from a cell tower. This is what **A-GPS** (USA satellites only) is all about.

Option 2: The phone downloads the almanac and related data directly from the satellites. This works fine but due to the very slow transmission rate it takes **15 – 20 minutes**.

If location services are always 'on' in a phone then that phone will always have a current GPS almanac and current GLONASS almanac.[6] As a result, the phone will always use both GPS and GLONASS to help produce coordinates.

However, using satellite data to determine location takes a lot of battery power. For that reason, many people leave location services off in their phone. If a phone (1) does not have current almanac data and (2) does not support A-GLONASS, then when location services are turned on that phone will:

1. Gets A-GPS data quickly from a cell tower
2. Uses **USA satellites only** to determine location
3. Starts downloading A-GLONASS data from GLONASS satellites (15-20 minutes before GLONASS data is used to help determine location)

This has a significant impact for the **indoor testing** that is underway. If a phone used as part of the indoor testing either (1) has a current GLONASS almanac and related data or (2) supports A-GLONASS, then **part of the indoor location accuracy produced by that phone will likely be due to the GLONASS data**. In order to fairly analyze the results of the indoor testing and compare apples to apples, the companies involved in the testing should be required to disclose whether the phones used in the testing (1) had a current GLONASS almanac and related data at the time of testing or (2) supported A-GLONASS.

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[6] As already noted, most phones produced within the last 5 years or so support both GPS and GLONASS.

Here is an easy, quick and free way to test any Android phone to see if it supports A-GLONASS.

1. Go to the phone's settings and set the location mode to "GPS only".
2. Install the free app "GPS Status & Toolbox".
3. Visit the website for this app so you know how to read the symbols and colors on the main screen. https://mobiwia.com/gpsstatus
4. Open the app and select Reset (under settings) to **clear the almanac data**.
5. Let the app find your location.

Within a few seconds you will see **green circles** on the screen indicating that the phone has (1) obtained A-GPS data from the cell towers and (2) is using GPS data to determine location. If within a few seconds you also see **green rectangles** then your phone supports A-GLONASS.

If the phone supports A-GLONASS then at the 30 second mark the phone has likely determined a fairly accurate location (~5 meter accuracy) because it used both the GPS and GLONASS constellations. That location will likely be reasonably accurate in difficult spots (heavy forest, wildland canyon, urban canyon, indoors), due to the larger number of satellites the phone can see. But if the phone does not support A-GLONASS then for the first 15-20 minutes the best accuracy you likely will see will be ~15 meters and easily much higher in difficult spots.

I own a Samsung Galaxy S6 Edge+ that I bought for testing purposes. Applying the above test shows that this phone supports A-GLONASS. Note that you cannot make any assumptions about different Samsung models since different models may very well use different location chips.

I also own an iPhone 4s and have tested it in heavy old growth forest in the Cascade Mountains east of Seattle. Prior to the test I made sure the phone had current almanac data for both the GPS and GLONASS constellations. My phone had no trouble at all display coordinates with an accuracy value of 10 meters or better in that heavy old growth forest. The one time when the phone did not display a location was quickly fixed simply by moving a few feet down the trail and thereby changing the sky view. **The notion that carriers can exempt large parts of the country from the phase 2 location requirements by claiming heavy forest is archaic and needs to be revisited.**

Respectfully submitted,

/s/

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